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CORRESPONDENCE TRAINING: AN EXAMPLE OF RULE-GOVERNED BEHAVIOR?

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Two groups of six mentally retarded adults were exposed to either a "say/do" correspondence training program or a "do only" reinforcement procedure to evaluate the suggestion of Rogers-Warren and Baer (1976) that reinforcement of the nonverbal target behavior in the absence of the relevant verbal behavior may account for the behavior changes seen in correspondence training. The participants worked in an experimental setting on a variety of manipulatory responses leading to various auditory and visual consequences. Analysis of individual patterns of responding indicated no apparent differences between the groups during training; four individuals in each group appeared to develop generalized correspondence skills. We conclude that the outcome of correspondence training may not necessarily be verbal regulation of behavior as is assumed. Rather, we suggest that the notion of rule-governed behavior can best account for the type of behavior changes seen in correspondence studies.

DESCRIPTORS: correspondence training, rule-governed behavior, verbal regulation, generalized verbal control, mentally retarded

A significant body of research has shown that the set of procedures known as correspondence training has proven successful in altering the rate of a variety of appropriate and inappropriate behaviors in preschool and mentally retarded children (e.g., Baer, Williams, Osnes, & Stokes, 1984, 1985; Guevremont, Osnes, & Stokes, 1986; Keogh, Burgio, Whitman, & Johnson, 1983; Osnes, Guevremont, & Stokes, 1986; Risley & Hart, 1968; Whitman, Scibak, Butler, Richter, & Johnson, 1982; Williams & Stokes, 1982). These procedures facilitate the development of a relationship between a person's verbal behavior and subsequent or prior nonverbal behaviors. This relationship is developed by the differential reinforcement of matching verbal/nonverbal behavior sequences, resulting in an increase in the rate of both the verbal and nonverbal behaviors. As suggested by Osnes et al. (1986), this outcome makes it appealing to conclude that correspondence training leads to the development of verbal self-regulation (Lovaas, 1961; Luria, 1961). However, because the verbal and nonverbal behaviors are both followed by reinforcement in correspondence training, one can predict an increase in both behaviors due to this reinforcement alone. The increases in behavior that result from correspondence training may therefore not reflect the development of verbal self-regulation but may simply reflect the correlated effects of reinforcement for each of these behaviors. The possible existence of such a reinforcement mechanism was suggested by Rogers-Warren and Baer (1976) but has yet to be examined. The existence of such a mechanism implies that subject verbalizations are unimportant for producing the behavior changes typically observed in correspondence training programs.

A prime rationale for the use of correspondence training is its presumed development of verbal self-regulation and hence its inherent programming of verbal mediators to promote maintenance and generalization (Israel, 1978; Whitman et al., 1982). These verbal mediators are not provided by a simple reinforcement mechanism, so generalized correspondence would not be predicted from this perspective. Consistent with this reinforcement notion, correspondence training has not reliably produced generalized behavior change (e.g., Rogers-Warren & Baer, 1976) and researchers have begun to add reinforcement-based procedures to promote generalization and maintenance (e.g., Baer et al., 1984;

Table 1
Response Devices and Consequences

Device	Consequences
Lever	Continuous red light
Plexiglas® panel	Slide
7.0 cm diameter black button	Computer display
2.8 cm diameter black button	Music
2.8 cm diameter red button	Electronic beeper
1.4 cm diameter black button	Video tape (no sound)
1.4 cm diameter red button	Flashing green light

Guevremont et al., 1986). It is important to determine whether the outcome of correspondence training is the ability to regulate overt behavior with verbalizations that lead to generalized behavior change, or whether performance merely reflects the results of a simple reinforcement contingency that requires additional mechanisms to promote generalization.

The purpose of this study was to compare the outcome of a reinforcement (do only) procedure with correspondence (say/do) training.

METHOD

Participants

Eighteen mentally retarded persons living in the community were recruited for participation. Their mean age was 28 years (standard deviation [*SD*] = 7.3) and their mean full scale IQ score on the Wechsler Adult Intelligence Scale was 53 (*SD* = 5.8). Six individuals were dropped from participation because they failed to successfully complete the familiarization phase. The 12 remaining participants (seven males and five females) were randomly assigned to either the correspondence training or the reinforcement group. All participants were paid the minimum hourly wage for their participation.

Setting and Materials

The study was conducted at two tables in an experimental room. On one table there was a savings box in which the participant placed extra earnings received during the session. The experimental apparatus, situated on the other table, presented the participants with seven different response devices associated with a unique audio or visual consequence (see Table 1). Each activation of a response device resulted in the presentation of 5 s of the response consequence. An Apple II Plus® microcomputer controlled the apparatus and recorded each manipulation of the devices on the response panel. An audio recorder recorded all verbal interactions between the experimenter and participant.

Dependent Variables and Recording

Data collection. The frequency of activation of each response device by a participant was recorded by the microcomputer. The observers (one graduate and one undergraduate student majoring in psychology) recorded from the audiotape whether the participant made the appropriate verbalization and whether the experimenter provided appropriate reinforcement and feedback for that trial. An appropriate verbalization by the participant was scored if he or she stated the behavioral intention being prompted by the experimenter (e.g., "I will only press the lever."). Correct reinforcement by the experimenter consisted of providing the appropriate social and monetary reinforcement at the time specified by the current experimental phase. Correct feedback consisted of providing the appropriate type of feedback at the time specified by the current experimental phase (see Procedures for details).

Reliability. Interobserver reliability assessments on appropriate verbalization by the participant and appropriate reinforcement and feedback by the experimenter were made on 25% of the experimental

trials. Reliability was assessed through overall, occurrence, and nonoccurrence percentage agreement measures as outlined by Hartmann (1977). All three reliability scores were 100% for the two experimenter behaviors. For appropriate participant verbalizations, reliability scores were 94% for overall, 93% for occurrence, and 80% for nonoccurrence.

Experimental Design

Once a participant completed the familiarization phase, the experimental phases were conducted one per day for 4 consecutive days. Each of these phases consisted of 12 trials of 20 responses. The sequence of experimental phases was the same for both groups: Baseline, Verbal Control 1, Treatment (correspondence training or reinforcement), and Verbal Control 2. A follow-up phase was conducted 2 months after the second verbal control phase. There were six participants in each treatment group.

Procedures

Familiarization. Each participant was first evaluated for his or her understanding of the concept "only" using two tasks. One task consisted of the participants having to determine if the experimenter selected only one type of item from a display of common objects (e.g., buttons, toy cars, blocks, pencils). The second task required the participant, upon request, to pick only one type of object from a display of items similar to those above. Three participants were eliminated from participation because they did not show evidence of understanding the concept "only."

Next, the participant was shown how to use the experimental apparatus using modeling and prompts. To complete this phase, a participant had to describe correctly the consequences of all seven responses three consecutive times without error. Three participants were eliminated from the study for their inability to attain this criterion.

Baseline. During this phase and all subsequent phases, the experimenter initially met with the participant in a room adjacent to the experimental room to receive payment for the time he or she was to spend working that day. The participant was then escorted to the experimental room and was seated in front of the apparatus. The experimenter then read the following instructions: "(*Name*), you may work on any of these things you want to for the next few minutes. While you are working here I'll be doing some work at the desk. I won't be able to talk to you because I'll be doing some important work also. You may start any time." Upon completion of 20 responses, the apparatus was programmed to turn off and the experimenter asked the participant to move to the other table in the room for a brief break lasting approximately 1 min. After the break, the panel was reactivated and the participant was instructed to return to work as described above. This continued for 12 trials. There were no specific time restrictions placed on performance of the responses during each trial.

Verbal control 1. Before initiating this phase, the three responses with the lowest frequency of occurrence during baseline were selected as target behaviors for the remainder of the study. All response devices, however, remained present and active. The participant was told that he or she would have the chance to earn 10 cents a trial contingent on appropriate verbalizations. The participant was then seated at the table with the savings box with his or her back to the apparatus.

Each trial began with the experimenter prompting the participant to verbalize his or her intention to perform one of the three target behaviors by saying, "(*Name*), are you only going to (*target behavior*)?" If the participant responded affirmatively, the experimenter asked him or her to verbalize his or her intended behavior: "Okay, you tell me what you are only going to do." The experimenter provided the minimal amount of verbal prompting necessary for the participant to make the appropriate verbalization. When the participant appropriately verbalized the target behavior, he or she was told, "(*Name*), that's good! You said you are going to only (*target behavior*). Because of that you can have this extra money. This extra money is for saying, I will only (*target behavior*)." The extra money earned for appropriate verbalizations was placed in the savings box. The participant was then directed to sit in front of the response

panel and instructed to begin working. After making 20 responses, the participant was asked to move to the other table in the room and, after a 1-min break, the verbal prompting for the next trial was initiated.

The experimenter prompted each participant to verbalize each of the three target behaviors on four separate trials to examine initial verbal control of each of these behaviors. The target behaviors were verbalized in a rotating order. After a specific target behavior was verbalized, it was not verbalized again until each of the other two target behaviors had been verbalized.

Treatment phase. During this phase, one group of participants received correspondence training according to a say/do format with one target behavior while the other group received reinforcement (do only) for one target behavior. The particular target behavior was selected at random for each person from those tested in the initial verbal control phase. The correspondence training procedure was similar to the verbal control procedure; however, the participant's appropriate verbalization of target behaviors no longer resulted in monetary reinforcement. This reinforcement was now contingent on the participant demonstrating correspondence between his or her verbalizations and actual performance of the referent behavior. When the participant verbalized his or her intention to perform the specific target behavior he or she merely received verbal praise. The reinforcement criterion for a behavior undergoing correspondence training required the participant to make the appropriate verbalization and perform the specified target behavior on all of the responses for that trial.

Following each trial, the experimenter and participant continued to meet at the table in the same manner as in the verbal control phase except that the experimenter said either: "(*Name*), you said you were going to work only on (*target behavior*), and you really did. Because of that I'm going to give you the extra money." or "(*Name*), you said you were going to work only on (*target behavior*), but you really didn't, did you? You did some other things too. Because of that I can't give you the extra money now. I hope you will try harder next time." After the 1-min break, the participant was asked again to verbalize his or her intention to perform the selected target behavior and returned to the response panel for the next trial.

Persons assigned to the reinforcement group were told they would have the chance to earn more money but were not specifically instructed how to do so. Although the experimenter had chosen one target behavior to reinforce throughout the condition, the experimenter did not prompt these participants to verbalize their intentions to perform the selected target behavior. Instead, at the beginning of each trial, the experimenter merely told the participant to sit in front of the response panel and go to work. Following the completion of each trial, the participant and experimenter seated themselves at the table with the savings box. At this time, the experimenter provided the participant feedback on his or her performance of the selected target behavior by saying, "(*Name*), you get this extra money because you worked on only (*target behavior*). You didn't work on anything else." If the participant did not perform the selected target behavior on all responses during that trial, the experimenter provided the following comment: "(*Name*), I can't give you this extra money because you did not work on only (*target behavior*). You did some other things too. Try harder next time."

Verbal control 2. The procedures for this condition were identical to the first verbal control phase.

Follow-up. The follow-up phase was conducted 2 months after completion of the second verbal control phase for those participants who showed evidence of generalized correspondence in that phase. All procedures were identical to the earlier verbal control phases.

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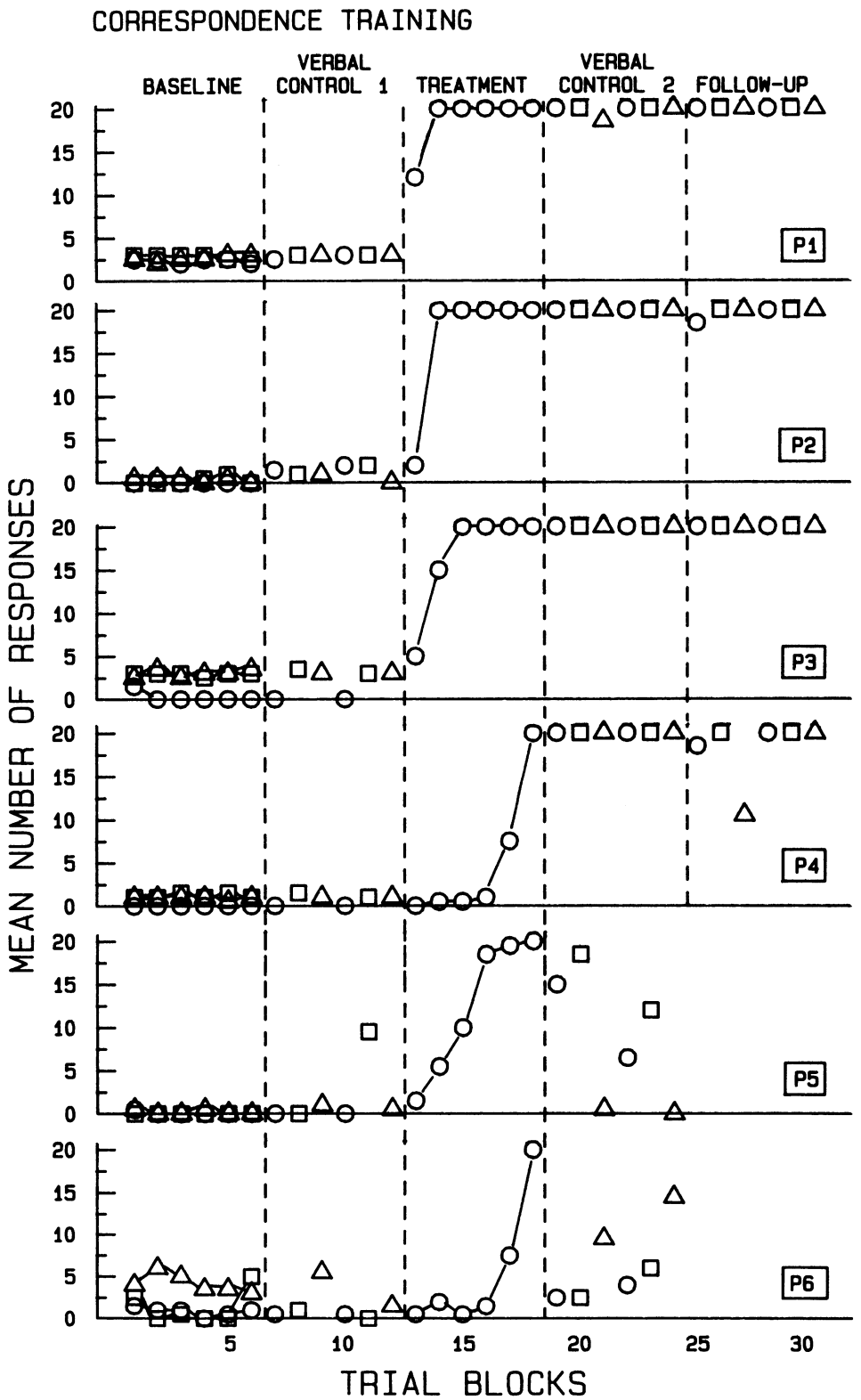
Figure 1. Number of responses for the nonverbal target behaviors of each of the six participants in the correspondence training group. All data are presented in blocks of two trials. Following baseline, only the performance for the behavior targeted during that trial block is displayed.


CORRESPONDENCE TRAINING
BASELINE
VERBAL CONTROL 1
TREATMENT
VERBAL CONTROL 2
FOLLOW-UP
P1
P2
P3
P4
P5
P6
MEAN NUMBER OF RESPONSES
TRIAL BLOCKS
0
5
10
15
20
25
30

RESULTS

Appropriate reinforcement and feedback by the experimenter were scored at 100% across all phases of the study. Appropriate verbalization by the participants was scored at 99% across all phases of the study. These data indicate that the experimenter reliably applied the procedures and that participants reliably engaged in the appropriate verbal behaviors.

Figure 1 presents the number of responses for the target behaviors by the participants in the correspondence training group across all phases. These data for the participants of the reinforcement group are shown in Figure 2. All data are presented in blocks of two trials.

Baseline. The data in both figures indicate all participants had consistently low operant levels of each of the individually selected behaviors.

Verbal control 1. Two data points resulted for each of the three behaviors due to the presentation of two-trial blocks of behavior. These data show virtually no change in the operant level of the target behaviors when the participants received reinforcement for the appropriate verbalization of their intentions to work on only a specified target behavior. This indicated a total lack of correspondence between saying and doing for these behaviors for all individuals in both groups.

Treatment. The data presented for this phase depict only the performance of the target behavior selected for training. Inspection of Figures 1 and 2 suggests that the correspondence training and reinforcement treatments produced relatively comparable increases in the selected target behaviors. Five of the six participants in the correspondence training group reached criterion (20 responses on target behavior in a trial) and only one showed no change over baseline. Three of six participants in the reinforcement group reached criterion, but two showed large improvement while falling short of criterion. As in the correspondence training group, only one person showed no treatment effect. The outcome of this phase provided support for the notion of Rogers-Warren and Baer (1976) that correspondence training may merely reflect reinforcement of the target behavior because both groups performed in a similar fashion despite the different training procedures.

Verbal control 2 and follow-up. Inspection of Figures 1 and 2 shows that four participants in each group maintained the trained target behavior at a level comparable to that attained during the treatment phase and also displayed strong evidence of generalization to the two untrained responses. Using the contingency-space analysis suggested by Matthews, Shimoff, and Catania (1987), it appears that generalized correspondence was developed in each group. That is, after training, the probability of engaging in either the trained or untrained target behaviors was directly related to the participants' verbal behavior. When a participant verbalized a particular behavior the probability of actually engaging in that behavior was very high, whereas the probability of engaging in the target behavior was very low in the absence of the relevant verbalization. Furthermore, these outcomes were fully maintained through the 2-month follow-up for each individual.

DISCUSSION

The results indicating little, if any, difference between the generalized correspondence behavior of individuals exposed to either a say/do or do only training procedure suggest that researchers must address two related issues regarding correspondence training. The first is to determine the conditions required for developing correspondence between verbal and nonverbal behavior. The second is to

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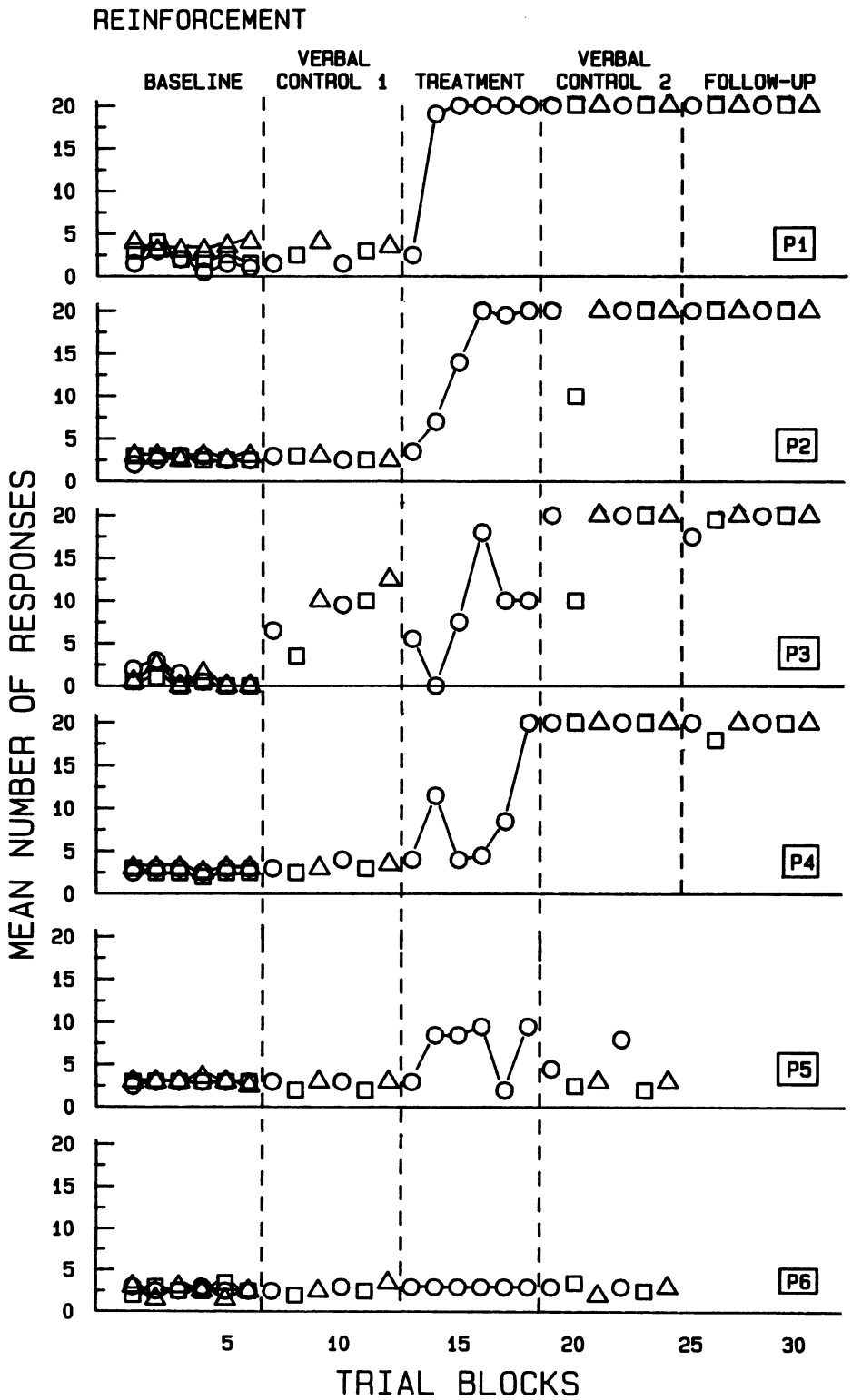
Figure 2. Number of responses for the nonverbal target behaviors of each of the six participants in the reinforcement group. All data are presented in blocks of two trials. Following baseline, only the performance of the behavior targeted for that trial block is displayed. Only participants displaying generalized correspondence following training participated in the follow-up.


REINFORCEMENT
BASELINE
VERBAL CONTROL 1
TREATMENT
VERBAL CONTROL 2
FOLLOW-UP
P1
P2
P3
P4
P5
P6
MEAN NUMBER OF RESPONSES
TRIAL BLOCKS
0
5
10
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determine exactly what participants are learning in correspondence training.

Regarding the first issue, researchers (e.g., Israel & Brown, 1977; Israel & O'Leary, 1973) have emphasized reinforcement of a particular verbal/nonverbal sequence as the key variable in the development of correspondence (Paniagua & Baer, 1982). In this study, however, individuals in the reinforcement group apparently developed generalized correspondence yet were never reinforced for the overt sequence of saying then doing used in the correspondence training group and in other related studies. This outcome lends support to the reinforcement notion of Rogers-Warren and Baer (1976). Whereas logic would dictate the necessity of some relevant verbal behavior by the subject to develop correspondence, apparently it need not be overt or necessarily prompted by the experimenter. Furthermore, Paniagua and Baer (1982) presented evidence that correspondence is a chain of behaviors that can be developed by presenting reinforcement at various points along the sequence, not only at the end of the sequence. Clearly, these data indicate that the process of developing correspondence is more complex than simply reinforcing a verbal/nonverbal sequence of behaviors.

The second major issue that needs to be addressed is what is being learned during correspondence training. Researchers in this area (e.g., Rogers-Warren & Baer, 1976; Whitman et al., 1982; Williams & Stokes, 1982) have typically assumed that correspondence training produces verbal self-regulation as described by Lovaas (1961) and Luria (1961). According to their thinking, verbal self-regulation develops from the social interactions between parent and child. Initially, young children's behavior is largely controlled by parental verbalizations. Eventually, children incorporate these verbalizations as their own and use them to guide their own behavior just as their parents' words once did. At first, children state these verbalizations overtly, but over time, they become covert. Logical argument and the results of this study, however, suggest that correspondence training may not necessarily establish such verbal regulation. First, most researchers have relied on the correlated increases in verbal and nonverbal behaviors seen in their studies to make their conclusion of verbal regulation. However, correlation does not necessarily imply causation; both behaviors could increase due to the effects of other variables. Second, most studies have failed to assess pretraining levels of verbal regulation on all target and generalization behaviors as was done in the present study (Baer et al., 1985). Unless it is determined prior to training that an individual cannot control his or her behavior with verbalizations, it cannot be concluded that training resulted in the development of this skill. Third, a key prediction based on verbal regulation is that it should lead to maintenance and generalization of behavior because it provides adequate verbal mediators (Israel, 1978). Recent research has added reinforcement-based generalization strategies to correspondence training because by itself, correspondence training has not been found to consistently produce generalized behavior changes (Baer et al., 1984, 1985; Guevremont et al., 1986). This failure to consistently promote generalization argues against the conclusion that verbal regulation of behavior has been developed. Fourth, it seems unlikely that verbal regulation can be developed within the time frame of most correspondence studies. In this study, for example, two groups of mentally retarded adults who had failed to acquire verbal regulation showed evidence of generalized correspondence after 12 training trials. Such rapid acquisition of this skill cannot be readily predicted from the perspective of Lovaas (1961) and Luria (1961), who emphasized that the emergence of verbal self-regulation was a slow, developmental process involving many parent-child interactions.

Perhaps the procedures of correspondence training and its outcomes can best be understood in terms of the concept of rule-governed behavior (Baldwin & Baldwin, 1986) rather than the form of verbal self-regulation described by Lovaas (1961) and Luria (1961). Rule-governed behavior develops when people are given, or generate on their own, a verbal description of the contingencies of reinforcement in a situation (i.e., a rule) and are reinforced for following that rule. A close look at correspondence training indicates that the procedures appear to foster development of a rule and to provide reinforcement for following it. All of the

information necessary for rule development is contained in the verbal interactions between the participant and the experimenter. Information on what the participant is expected to do is provided first by prompting verbalization of the target behavior. Feedback after the opportunity to perform the target behavior further informs the participant about the entire sequence of events critical to understanding the contingency and is essentially a statement of the rule to be developed. That is, typical feedback in correspondence training includes information about what the participant said (e.g., "You said you were going to (*response*) . . ."), and how it relates to what the participant actually did (e.g., ". . . and you did (or didn't) (*response*)."). It also includes information about the contingency of reinforcement in operation (e.g., "Because you did, you get (*reinforcer*)." or, "Because you didn't, you don't get (*reinforcer*).").

Once the rule is developed, there are several potential sources of reinforcement for following it. These sources include the social interactions between the experimenter and subject that occur throughout the training sequence, the contingencies provided by the natural environment for engaging or not engaging in the target behavior, and, of course, the reinforcement delivered by the experimenter as part of the training.

Although it seems that all of the necessary ingredients for developing rule-governed behavior are present in correspondence training, a participant may not actually form a rule or may form an inappropriate one. One rule that might be developed is, "To get the (*reinforcer*), I have to do what I say (or what the experimenter said)." This rule should result in the subject developing generalized correspondence because it is not specific to a particular overt behavior and might be called a generalized correspondence rule. A second rule might be, "To get the (*reinforcer*), I have to say and do (*response*)." This rule should result in correspondence for the target behavior but generalized correspondence would not be expected because it is specific to a particular overt behavior. This might be called a discriminated correspondence rule. A third rule might be an incorrect one, perhaps likely to be generated early in training, for example, "I get the (*reinforcer*) when the experimenter asks me to say something." An incorrect rule would be expected to result in the display of neither discriminated nor generalized correspondence. Finally, subjects may fail to produce any rule at all and, of course, no form of correspondence would be expected.

Support for this approach to understanding correspondence training is seen in a study by Williams and Stokes (1982). Following the failure of correspondence training, their subjects practiced an example of the generalized correspondence rule discussed above: "You have to do what you say you will do." The training of this rule produced correspondence, thereby supporting the presence of a rule to develop this behavior. The results of the present experiment can also be understood from the perspective of correspondence training as producing rule-governed behavior, because this perspective would predict (as did occur) no differential outcome between say/do correspondence training and reinforcement for doing. That is because the feedback given to both groups contained sufficient information for rule development as described above and reinforcement was available in each paradigm. So although the reinforcement group was not required to "say," they nonetheless could have developed a rule from the feedback they were given.

In conclusion, this theory of correspondence training as developing rule-governed behavior is quite tentative due to the fact that there is no direct evidence to support it at present. It is, however, a testable theory. Data to evaluate it could be obtained by exposing people lacking correspondence skills (e.g., preschool children or mentally retarded persons) to various training conditions that should correlate with the development of the different types of correspondence rules discussed in this paper and determining whether subsequent responding matches those rules.

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